

## **Characterization of historical mortars from the Portuguese Citadel in Ksar Seghir (Morocco)**

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### **Abstract**

Ksar Seghir was a privileged place to control the Strait of Gibraltar throughout the centuries, being implanted in its southern bank, nowadays in Moroccan territory. Its prominence led to the construction of a unique circular wall and monumental doors during the Marinid dynasty in the late 13th century. The defensive system was later reformulated during the Portuguese occupation between 1458 and 1550, which sought a technical update, namely the introduction of new defensive devices adapted for artillery, that was gaining importance in the Mediterranean context.

After its abandonment by the Portuguese, the town remained unoccupied, being today an archaeological site. Since 2008, the Moroccan government has undertaken a program to value the site and its structures, namely through various conservation and restoration actions. From 2011 a team of Moroccan and Portuguese researchers began a project to deepen the study and restore Ksar Seghir's archaeological contexts, which led to the characterization of its structures, specifically the type of construction materials and techniques used. One of our main focuses has been the defensive system, for its impressiveness and historical richness. In this context, the work that is being carried out at Laboratory HERCULES, aims the material study of several mortar samples, collected from the Portuguese Citadel. The analytical methodology employed is an adaptation of standard analytical procedures used in historical mortars studies.

The results of textural, mineralogical and chemical characterization allow, among others, the identification of mortars binder and aggregates and also the determination of the binder: aggregates ratio. This provides useful information regarding the history and the construction techniques of the different spots according to its purpose. Moreover, the acquisition of data on the mortars textural, chemical and mineralogical features is essential to assist conservator-restorers in the correct choice and production of replacement and/or repair mortars that are compatible from a physical as well as chemical point of view with the original ones.

### **Keywords**

Ksar Seghir; Historical Mortars; Mineralogical and Chemical Characterization